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Effect of Digital Transformation on Administrative Efficiency in the Nigerian Senate

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Abstract: *This study examined the effect of digital transformation on administrative efficiency in the Nigerian Senate, with particular emphasis on digital infrastructure, workflow automation and e-records management, and staff digital competence. The study was motivated by the growing policy and institutional relevance of digital transformation in public administration and the need to determine whether visible digital reforms in the Senate have translated into measurable improvements in internal administrative operations. A cross-sectional survey design and quantitative approach were adopted. The population comprised 109 Senators, and a census technique was used. Data were collected through a structured questionnaire, out of which 93 valid responses were returned and analysed. Descriptive statistics, Pearson correlation, and multiple regression were employed for data analysis at the 0.05 level of significance. The findings revealed that digital infrastructure has a strong and statistically significant positive effect on administrative efficiency ($\beta = .640$, $p < .001$), while workflow automation and erecords management also exert a significant positive effect ($\beta = .232$, $p = .014$). However, staff digital competence, though positively related to administrative efficiency, did not have a statistically significant independent effect ($\beta = .140$, $p = .113$). The regression model showed high explanatory power, accounting for 86.6% of the variation in administrative efficiency ($R^2 = .866$). The study concludes that administrative efficiency in the Nigerian Senate depends more directly on robust digital systems and automated administrative processes than on staff competence alone. It recommends sustained investment in digital infrastructure, deeper automation of records and workflows, and more task-specific digital capacity development.*

Keywords: digital transformation, administrative efficiency, digital infrastructure, workflow automation, e-records management, staff digital competence, Nigerian Senate

INTRODUCTION

Digital transformation has moved from being a peripheral modernization agenda to becoming a central question of how public institutions organize work, manage records, coordinate units, and deliver outcomes with speed and reliability. United Nations Department of Economic and Social Affairs (2024) reports that digital government is advancing across all 193 member states, with the proportion of the global population living in lagging digital-government environments falling markedly between 2022 and 2024. Organisation for Economic Co-operation and Development (2025) similarly presents digital government as a core governance capability for building more seamless, responsive, and

measurable public administrative services. In the public-management literature, Haug et al. (2024) further argue that digital transformation should be understood not as the mere acquisition of technologies, but as digitally induced change that reshapes routines, structures, and administrative relationships within the public sector. Digital transformation is therefore best treated as an institutional capability problem rather than a narrow technology problem.

Administrative efficiency in public institutions is no longer judged only by formal compliance with procedure, but also by the speed of internal processing, the accuracy of records, the reduction of duplication, the reliability of communication, and the coordination of workflows across units. Yang et al. (2024) show that digital transformation enhances governmental efficiency and that the efficiency gains become stronger when transformation efforts are coordinated rather than fragmented. Gong and Yang (2024) also demonstrate that digital government performance depends on combinations of strategic factors such as digital infrastructure, innovation capability, information security, and organizational adjustment, which means that efficiency improvements are not automatic consequences of adopting digital tools. The implication is clear: public institutions may invest in technology and still fail to achieve administrative efficiency if digital systems are weakly integrated into everyday work processes.

Inter-Parliamentary Union (2024) reports that 68% of parliaments now operate with a multi-year digital strategy and that the use of cloud computing and artificial intelligence is increasing across parliamentary institutions worldwide. This global trend matters because parliaments are not only law-making arenas; they are also complex administrative systems that depend on document management, committee coordination, information circulation, procedural tracking, and records integrity. In Nigeria, National Assembly of the Federal Republic of Nigeria (2026) already provides visible digital tools through its parliamentary portal, including live plenary access, bill tracking, Hansards, order papers, votes and proceedings, and a legislative dashboard. These developments suggest that the Nigerian Senate is not outside the digital turn in parliamentary administration. What remains less clear is whether the spread of these digital mechanisms has translated into stronger internal administrative efficiency within the Senate's bureaucratic operations.

Public institutions often display digital progress through websites, portals, dashboards, and online services, yet such outward signs do not in themselves prove that internal administrative work has become faster, more accurate, or better coordinated. National Assembly of the Federal Republic of Nigeria (2025), through the National Digital Economy and E-Governance Bill, explicitly links electronic transactions, electronic records, digital service delivery, and the strengthening of government processes, procedures, systems, efficiency, and transparency. That policy direction makes digital transformation highly relevant to the Nigerian public sector, including legislative administration. However, there is still insufficient empirical clarity on whether digital infrastructure, workflow automation and e-records management, and staff digital competence are improving the day-to-day efficiency of administrative work in the Nigerian Senate, especially in areas such as file movement, records retrieval, communication flow, approval cycles, and inter-unit coordination. The practical problem, therefore, is not whether digital transformation is normatively desirable, but whether it is actually improving administrative efficiency in a rule-bound legislative institution.

The existing literature leaves that question open in at least three important ways. First, Haug et al. (2024) show that recent scholarship on digitally induced change in the public sector is growing rapidly, but it remains broad and uneven, with much stronger attention to public-sector transformation in general than to legislative bureaucracies in particular. Second, Yang et al. (2024) and Gong and Yang (2024) generate valuable evidence on digital transformation, strategy, and performance in government settings, yet their focus is not on parliaments and not on the internal administrative realities of an African legislature. Third, Ahn and Chen (2022) show that employee perceptions, familiarity, and training matter for the successful uptake of new technologies in government, while van Roekel et al. (2025) show that digital transformation leadership in public organizations contains strategic and operational dimensions tied directly to employees, internal processes, and outputs. Even so, recent evidence still provides limited survey-based knowledge on how these human and process dimensions relate to administrative efficiency in a legislative institution such as the Nigerian Senate. The literature therefore contains a context gap, an institutional gap, and an outcome gap.

These gaps are analytically important because the Nigerian Senate is a distinctive administrative environment. Its effectiveness depends not only on broad notions of digital modernization, but also on disciplined records management, coordination among departments, procedural continuity, and timely movement of official information across administrative chains. In such a setting, digital transformation cannot be treated as symbolic modernization or website visibility alone. It must be evaluated in relation to whether it reduces delays, improves information handling, strengthens coordination, and enhances administrative output. A study that focuses directly on administrative efficiency in the Nigerian Senate therefore addresses a question that is both theoretically relevant and practically urgent.

Against this background, this study examines the effect of digital transformation on administrative efficiency in the Nigerian Senate, with particular attention to digital infrastructure, workflow automation and e-records management, and staff digital competence. Specifically, the study seeks to

i. examine the effect of digital infrastructure on administrative efficiency in the Nigerian Senate,
ii. assess the effect of workflow automation and e-records management on administrative efficiency in the Nigerian Senate, and
iii. determine the effect of staff digital competence on administrative efficiency in the Nigerian Senate.

LITERATURE REVIEW

Conceptual Review

Digital Transformation

Digital transformation refers to the broad institutional process through which public organizations redesign their structures, routines, information flows, and decision processes through the use of digital technologies. In public administration, it is not simply the acquisition of computers, software, or online platforms; rather, it involves the reconfiguration of administrative processes so that work is performed more quickly, more accurately, and with greater coordination across units. Recent public-sector research shows that digital transformation improves governmental efficiency when it is coordinated and embedded in organizational processes, while broader review evidence treats digitally induced

change as a process that reshapes structures, routines, and outcomes across the public sector (Haug et al., 2024; Yang et al., 2024; Gong and Yang, 2024). In the context of this study, digital transformation means the use of digital systems and digitally enabled administrative arrangements to improve internal operations in the Nigerian Senate.

Digital Infrastructure

Digital infrastructure refers to the foundational technological resources that support digital operations within an institution. It includes internet connectivity, hardware, software applications, networks, databases, platforms, and interoperable information systems that enable communication, coordination, and records handling. In government settings, digital infrastructure matters because digital transformation depends on the existence of a reliable technical base; where infrastructure is weak, digital reforms often remain symbolic or fragmented. Recent evidence shows that digital infrastructure is one of the strategic factors shaping digital government performance, while parliamentary evidence indicates that many legislatures now operate within an expanding digital environment supported by multi-year digital strategies, cloud tools, and related technologies (Gong and Yang, 2024; Inter-Parliamentary Union, 2024). The Nigerian National Assembly's portal likewise reflects this digital environment through bill tracking, Hansard access, live proceedings, and related parliamentary information services (National Assembly of the Federal Republic of Nigeria, 2026). In this study, digital infrastructure means the adequacy, reliability, and functionality of the digital facilities that support administrative work in the Nigerian Senate.

Workflow Automation and E-Records Management

Workflow automation and e-records management refer to the use of digital systems to route, process, store, retrieve, monitor, and preserve official records and administrative tasks electronically. Workflow automation focuses on reducing manual bottlenecks in approvals, routing, communication, and task execution, while e-records management emphasizes the orderly creation, storage, classification, access, retention, and retrieval of records in digital form. This concept is important because administrative efficiency depends heavily on how quickly documents move, how easily records can be retrieved, and how well official information is preserved and reused. Studies in the public sector show that weak records systems undermine institutional continuity, while stronger digital records practices improve control, traceability, and organizational effectiveness (Shibambu and Marutha, 2022; Malatji and Marutha, 2023; Matlala and Ncube, 2025; Modiba, 2025). In the present study, workflow automation and e-records management mean the extent to which the Nigerian Senate uses electronic systems to manage records and routine administrative processes in a timely, traceable, and coordinated way.

Staff Digital Competence

Staff digital competence refers to the knowledge, skills, familiarity, confidence, and practical ability required to use digital tools effectively in daily administrative work. In public organizations, digital competence matters because technology cannot improve performance unless employees understand how to use it, adapt to it, and integrate it into routine tasks. Recent evidence shows that familiarity or prior experience with digital tools positively shapes willingness to support technological adoption in government, and that employee training and education are important for meaningful digital transformation (Ahn and Chen, 2022). Other public-administration evidence similarly shows that digital competencies are linked to readiness for institutional change, while digital transformation

leadership research emphasizes that public-sector digital change also depends on how managers guide employees and internal processes (David et al., 2024; van Roekel et al., 2025). In this study, staff digital competence means the capacity of personnel involved in Senate administration to use digital systems effectively for records, communication, coordination, and task performance.

Administrative Efficiency

Administrative efficiency refers to the extent to which an institution performs its internal administrative functions with speed, accuracy, coordination, consistency, and minimal waste of time or resources. In a legislative bureaucracy, administrative efficiency is reflected in the timely movement of files, reliable retrieval of records, smooth communication across departments, effective coordination of approvals, and continuity in procedural operations. Public-sector evidence indicates that digital transformation enhances governmental efficiency, especially when transformation efforts are coordinated rather than fragmented, while broader digital-government studies show that performance depends on combinations of infrastructural, organizational, and process factors rather than on isolated tools (Yang et al., 2024; Gong and Yang, 2024; Han and Zhang, 2024). For this study, administrative efficiency means the ability of the Nigerian Senate's administrative system to process work, manage records, circulate information, and coordinate official activities effectively through digitally supported arrangements.

Conceptual Framework

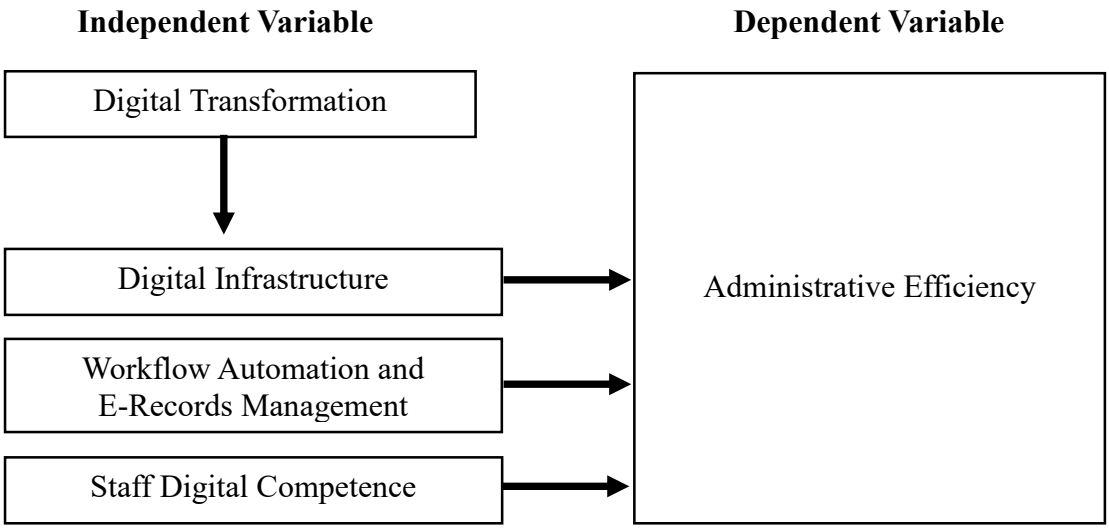

Figure 2.1: Digital Transformation and Administrative Efficiency

Source: Authors' Compilation (2026)

Theoretical Review

This study is anchored on Socio-Technical Systems Theory. Developed by Eric Trist, Ken Bamforth, and Fred Emery at the Tavistock Institute in the 1950s, based on studies of British coal mining, where technological changes (longwall method) disrupted social working arrangements, reducing productivity.The theory explains that organizational effectiveness is highest when the technical system and the social system are jointly optimized rather than treated separately. In the context of digital transformation, socio-technical thinking argues that organizations do not improve merely by introducing new technologies; they improve when technology, work structures, and human capability are designed to function together. Recent socio-technical scholarship emphasizes that sustainable organizational solutions depend on aligning social and technical aspects, especially in periods of digital transformation (Govers and van Amelsvoort, 2023).

The theory is appropriate for this study because the variables fit naturally into its two core dimensions. Digital infrastructure and workflow automation and e-records management belong mainly to the technical system, since they concern the digital platforms, connectivity, records architecture, and process technologies through which administrative work is performed. Staff digital competence belongs mainly to the social system because it concerns the human knowledge, skill, adaptation, and capacity required to use those systems effectively. Administrative efficiency is the institutional outcome expected when the technical and social systems are properly aligned. From this perspective, the Nigerian Senate will achieve higher administrative efficiency not simply because digital tools are present, but because reliable digital infrastructure, embedded automated workflows, and competent personnel operate together in a mutually reinforcing way. Socio-Technical Systems Theory therefore provides a coherent explanation for examining how digital infrastructure, workflow automation and e-records management, and staff digital competence combine to shape administrative efficiency in the Nigerian Senate.

Empirical Review

Tangi et al. (2021) quantitatively examined digital government transformation in Italian public administrations using structural equation modelling on survey data from 491 administrations. They found that managerial activities were central to digital transformation, while organizational barriers significantly hindered progress. The study is relevant because it shows that digital transformation is not only technological but also administrative, although it did not focus on legislative institutions such as the Senate.

Koryzis et al. (2021) developed a transformation framework for the digital parliament using an expert survey of parliamentarians and parliamentary administrators. Their findings emphasized information and knowledge-sharing systems, digital tools, and organizational readiness as critical to future parliamentary transformation. The study is directly relevant to the parliamentary setting, but it focused more on framework design than on administrative efficiency as an outcome. Zuiderwijk et al. (2021) conducted a systematic review of 26 studies on artificial intelligence in public governance and found that the literature was still exploratory, fragmented, and practice-driven. Their review showed that AI adoption in government carries both efficiency opportunities and governance risks. The study is relevant because it highlights the technological side of digital transformation in public administration, but it did not isolate the effect of digital transformation on internal administrative efficiency.

Ahn and Chen (2022) examined government employees' perceptions of AI-augmented public administration and found that familiarity with AI and prior experience positively influenced willingness to use AI in government. They also stressed the importance of staff training and education in enabling digital transformation. The study is highly relevant to staff digital competence, but it focused on willingness to adopt AI rather than on administrative efficiency within a legislature.
Shibambu and Marutha (2022) investigated digital records management in the South African public sector and proposed a framework for managing digital records in the cloud. Their study found that government departments continued to struggle with manual paper-based systems and lacked a government-owned cloud environment for proper digital records management. The study strongly supports the relevance of e-records management, but it focused on cloud records rather than broader workflow automation in parliamentary administration.

Malatji and Marutha (2023) studied the implementation of the legislative framework governing records management throughout the life cycle in the Limpopo provincial government of South Africa. Using a quantitative multi-method design, they found that records management effectiveness depended on proper legal implementation, monitoring, and institutional compliance. This study is important for understanding workflow and records control, though it did not examine digital transformation as a broader administrative reform process. Shibambu (2023) explored strategies for developing digital infrastructure to rescue stagnant archival holdings in South Africa. Using an interpretive case-study design with semi-structured interviews, the study found that weak digital infrastructure remained a major barrier to effective public-sector record preservation and access. The study is highly relevant to digital infrastructure, but it focused on archives and not on the day-to-day efficiency of administrative work in a legislature.

David et al. (2024) examined public administration managers' and employees' adaptability to change under the future-of-work paradigm using PLS-SEM. They found that digital competencies and intrapreneurial competencies significantly improved readiness for the future of work. The study is relevant to staff digital competence, yet it focused on workforce readiness rather than administrative efficiency in a parliamentary bureaucracy. Yang et al. (2024) examined the impact of digital transformation on governmental efficiency using text analysis and empirical models across government departments between 2012 and 2022. They found that digital transformation improved governmental efficiency and that coordinated transformation amplified those gains. The study is central to the present topic, but it did not focus on parliaments or on the internal bureaucratic operations of the Senate.Gong and Xinyi Yang (2024) investigated strategies for digital government transformation using data from 31 provincial regions over four years. They found that digital government performance depends on combinations of strategic factors, including digital infrastructure, innovation capability, information security, and public demand, and that these factors operate configurationally rather than independently. The study is important because it supports the role of digital infrastructure, but it focused on digital government performance broadly rather than administrative efficiency in a legislative institution.

Han and Zhang (2024) studied government digitalization and its influence on government functions transformation in county-level governments in China using structural equation modelling. They found that digitalization planning, policy, technology, and platforms all contributed to government functions transformation, with digital platforms exerting the strongest direct effect. The study is relevant to

institutional transformation, though it was not undertaken in a parliamentary environment and did not isolate workflow automation or staff competence. Shibambu (2024) investigated the transformation of digital government services in the South African public sector using qualitative interviews with information technology officers, analysts, and administrative officers. The study found that digital government services could improve efficiency, accountability, and transparency, but implementation depended heavily on digital infrastructure and organizational readiness. The study is useful for public-sector comparison, though it did not focus on legislative administration or the Senate.

Shibambu and Ngoepe (2024) explored how digital transformation could enhance service delivery in the South African public sector through a qualitative case-study design. They found that the absence of coherent legislation and digital strategy led to inconsistent implementation of digital transformation. The study is relevant because it connects digital transformation to institutional outcomes, but its focus was service delivery rather than administrative efficiency. Sandoval-Almazan et al. (2024) examined public managers' competencies for AI implementation in local government using a survey of 38 public managers in the State of Mexico. They found limited AI skills among managers, with digital management and execution being the most decisive competence. The study is relevant to staff competence and managerial capacity, but it dealt with local government managers rather than Senate administrators or senators.

Majrashi (2024) investigated the determinants of public-sector managers' intentions to adopt AI in the workplace using a survey of 330 managers. The study found that perceived usefulness, perceived impact, and isomorphic pressure significantly influenced intention to adopt AI systems. The study is relevant to digital adoption in public organizations, though it focused on adoption intention rather than on actual administrative efficiency outcomes. The Inter-Parliamentary Union (2024) produced the *World e-Parliament Report 2024* based on survey responses from 115 parliaments or chambers in 86 countries and supranational legislatures. The report found that 68% of parliaments had multi-year digital strategies, while AI and cloud computing were increasingly used and cybersecurity had become a major priority. This report is highly relevant to the Senate context because it addresses parliamentary digitalization directly, but it reports broad comparative trends rather than staff-based evidence on administrative efficiency inside a specific parliament. van Roekel et al. (2025) developed and validated a public value-centered digital transformation leadership scale for public organizations. Their findings showed that digital transformation leadership has both strategic and operational dimensions, including vision, collaboration, employee guidance, internal processes, and outputs. The study is relevant because it strengthens the human and leadership side of digital transformation, but it did not test digital infrastructure or records automation as direct predictors of efficiency.

Haesevoets et al. (2025) experimentally examined AI adoption in public administration by comparing the perspectives of managers and non-managerial employees. They found general skepticism toward AI, with stronger acceptance when AI served as an advisory tool rather than an autonomous decision-maker, and managers showing slightly greater readiness than non-managers. The study is important for understanding employee acceptance of digital tools, but it focused on AI adoption attitudes rather than measurable administrative efficiency. Matlala and Ncube (2025) investigated electronic records management in South African government departments through a systematic review. They found major problems including weak skills, poor management support, insufficient resources, and weak legislative and policy alignment, concluding that existing records programmes were not sufficiently efficient or

effective. This study is highly relevant to workflow automation and e-records management, though it did not examine a parliamentary institution. Modiba (2025) examined the adoption of artificial intelligence to improve records management practices at the Gauteng Department of Education using a convergent mixed-methods design. The study found that AI could effectively support records management across the records life cycle and proposed an implementation framework for public organizations. The study is relevant because it links records modernization to administrative practice, but it remains sector-specific and does not address Senate administration.

Literature Gap

Although Koryzis et al. (2021) and the Inter-Parliamentary Union (2024) focused on parliamentary digitalization, most of the reviewed studies examined public administration, local government, education departments, or cross-government settings rather than the internal bureaucracy of a legislature. Studies such as Tangi et al. (2021), Yang et al. (2024), Gong and Yang (2024), Han and Zhang (2024), and Shibambu and Ngoepe (2024) generated valuable insights on public-sector digital transformation, but they did not address the distinctive administrative environment of the Senate, where records flow, committee coordination, document movement, and approval chains are especially central.

The reviewed studies tended to examine digital transformation through isolated constructs. Ahn and Chen (2022), David et al. (2024), Sandoval-Almazan et al. (2024), Majrashi (2024), van Roekel et al. (2025), and Haesevoets et al. (2025) concentrated mainly on competence, readiness, leadership, or AI acceptance, while Shibambu and Marutha (2022), Malatji and Marutha (2023), Matlala and Ncube (2025), and Modiba (2025) focused more specifically on records management or legal compliance. Similarly, Yang et al. (2024) and Gong and Yang (2024) emphasized overall efficiency and digital government performance. Yet these studies did not integrate digital infrastructure, workflow automation and e-records management, and staff digital competence into one unified explanatory model of administrative efficiency.

Many of the studies reviewed focused on service delivery, digital government performance, readiness for the future of work, willingness to use AI, leadership capability, or records compliance rather than on administrative efficiency as a direct institutional outcome. For example, Shibambu (2024) and Shibambu and Ngoepe (2024) centered on service delivery; Ahn and Chen (2022), Sandoval-Almazan et al. (2024), Majrashi (2024), and Haesevoets et al. (2025) focused on perception and adoption; and van Roekel et al. (2025) focused on leadership measurement. Even where efficiency was discussed, as in Yang et al. (2024), the evidence remained broad and governmental rather than specific to the internal administrative operations of a legislative institution. This leaves an unresolved empirical gap concerning whether digital transformation actually improves file movement, records retrieval, communication flow, procedural speed, and inter-unit coordination in the Nigerian Senate.

METHODOLOGY

This study adopted a cross-sectional survey design and quantitative approach to examine the effect of digital transformation on administrative efficiency in the Nigerian Senate. The study was conducted at the Nigerian Senate, National Assembly Complex, Abuja. The population comprised 109 Senators, being the official numerical composition of the Senate. Given the institutional focus of the study, the

respondents were considered appropriate for providing informed perceptions of the Senate's digital systems, administrative processes, and overall efficiency.

Given the manageable size of the population, a census technique was adopted. Primary data were collected through a structured questionnaire. Section A captured demographic data, while Section B measured the study variables on a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. The digital infrastructure items were adapted from Gong and Yang (2024) and Yang, Gu, and Albitar (2024); workflow automation and e-records management items were adapted from Shibambu and Marutha (2022), Malatji and Marutha (2023), and Matlala and Ncube (2025); staff digital competence items were adapted from Ahn and Chen (2022) and David et al. (2024); while administrative efficiency items were adapted from Yang, Gu, and Albitar (2024) and Han and Zhang (2024).

Face and content validity were established through expert review, while reliability was assessed using Cronbach's Alpha, with 0.70 as the acceptable benchmark. Data were analysed in SPSS using descriptive statistics, Pearson correlation, and multiple regression at the 0.05 significance level. Because the respondents were Senators rather than operational staff, the findings should be interpreted as institutional-level perceptions of administrative efficiency within the Nigerian Senate.
The model was specified as:
$AE = \beta_0 + \beta_1 DI + \beta_2 WERM + \beta_3 SDC + \varepsilon$.
Here, AE = Administrative Efficiency, DI = Digital Infrastructure, WERM = Workflow Automation and E-Records Management, SDC = Staff Digital Competence, β_0 = constant term, β_1-β_3 = regression coefficients, and ε = error term.

RESULTS AND DISCUSSION

Table 1 - Descriptive Statistics for the Study Variables

Variable	N	Mean	SD	Variance	Skewness	SE	Kurtosis
AE	93	2.65	1.40	1.97	.322	.250	-1.235
DI	93	2.75	1.47	2.17	.189	.250	-1.397
WERM	93	2.49	1.59	2.54	.464	.250	-1.486
SDC	93	2.49	1.42	2.01	.443	.250	-1.162

Source: Authors' Computation (2026)

The mean scores show that the respondents rated digital transformation and administrative efficiency at modest levels in the Nigerian Senate. Digital infrastructure recorded the highest mean (M = 2.75), followed by administrative efficiency (M = 2.65), while workflow automation and e-records management and staff digital competence both recorded lower means (M = 2.49). Since these values are below the neutral benchmark of 3.00 on the five-point scale, the result suggests that digital systems, automated records processes, and digital skills are present but not yet sufficiently strong or deeply institutionalised. The standard deviations, which range from 1.40 to 1.59, indicate noticeable variation in respondents' views. The positive skewness values and negative kurtosis values further suggest that responses were moderately dispersed and somewhat concentrated toward the lower end of the scale.

Table 2 - Pearson Correlations Among the Study Variables

Variable	AE	DI	WERM	SDC
AE	1.000	.893**	.804**	.766**
DI	.893**	1.000	.697**	.652**
WERM	.804**	.697**	1.000	.896**
SDC	.766**	.652**	.896**	1.000

Source: Authors' Computation (2026)

The correlation matrix shows that all the variables are positively and significantly related to administrative efficiency. Administrative efficiency has a very strong positive relationship with digital infrastructure ($r = .893$, $p < .01$), a strong positive relationship with workflow automation and e-records management ($r = .804$, $p < .01$), and a strong positive relationship with staff digital competence ($r = .766$, $p < .01$). The correlations among the independent variables are also positive and statistically significant. Particularly notable is the very strong relationship between workflow automation and e-records management and staff digital competence ($r = .896$, $p < .01$), which suggests substantial shared variance between these two variables.

Table 3 - Model Summary for the Effect of Digital Transformation on Administrative Efficiency

Model	R	R^2	Adjusted R^2	Std. Error	Durbin-Watson
1	.930	.866	.861	.523	1.210

Source: Authors' Computation (2026)

Table 3 shows that the combined relationship between the predictors and administrative efficiency is very strong ($R = .930$). The coefficient of determination ($R^2 = .866$) indicates that digital infrastructure, workflow automation and e-records management, and staff digital competence jointly explain 86.6% of the variation in administrative efficiency. The adjusted R^2 of .861 confirms that the explanatory power of the model remains high after adjusting for the number of predictors. This suggests that the selected dimensions of digital transformation are highly relevant to administrative efficiency in the Nigerian Senate.

Table 4 - ANOVA for the Regression Model

Source	Sum of Squares	df	Mean Square	F	p
Regression	156.965	3	52.322	191.434	< .001
Residual	24.325	89	.273		
Total	181.290	92			

Source: Authors' Computation (2026)

The ANOVA result shows that the regression model is statistically significant, $F(3, 89) = 191.434$, $p < .001$. This means that the three predictors, taken together, significantly explain changes in administrative efficiency.

Table 5 - Regression Coefficients for the Study Variables

Predictor	B	SE B	β	t	p
Constant	.108	.123		.878	.382
DI	.611	.052	.640	11.775	< .001
WERM	.204	.082	.232	2.494	.014
SDC	.139	.087	.140	1.600	.113

Source: Authors' Computation (2026)

Table 5 shows that digital infrastructure has a positive and statistically significant effect on administrative efficiency (B = .611, β = .640, t = 11.775, p < .001). Workflow automation and e-records management also have a positive and significant effect (B = .204, β = .232, t = 2.494, p = .014). Staff digital competence has a positive coefficient, but its effect is not statistically significant at the 5% level (B = .139, β = .140, t = 1.600, p = .113). The estimated regression model is therefore stated as: AE = .108 + .611DI + .204WERM + .139SDC + ε.

Test of Hypotheses

H01: Digital infrastructure has no significant effect on administrative efficiency in the Nigerian Senate.

The result for digital infrastructure shows a positive and statistically significant effect on administrative efficiency in the Nigerian Senate (B = 0.611, Beta = 0.640, t = 11.775, p < .001). Since the probability value is less than the 0.05 significance threshold, the null hypothesis is rejected. This means that digital infrastructure exerts a significant positive influence on administrative efficiency in the Nigerian Senate. This finding implies that improvements in digital infrastructure are associated with corresponding improvements in administrative efficiency. In substantive terms, the availability and functionality of digital tools, platforms, communication systems, and related technological facilities contribute meaningfully to faster processing, better coordination, and improved administrative output. The relatively high standardized beta coefficient further indicates that digital infrastructure is the strongest predictor in the model, suggesting that it constitutes the most critical digital transformation factor shaping efficiency within the Senate's administrative system.

H02: Workflow automation and e-records management have no significant effect on administrative efficiency in the Nigerian Senate.

The regression result indicates that workflow automation and e-records management have a positive and statistically significant effect on administrative efficiency (B = 0.204, Beta = 0.232, t = 2.494, p = .014). Because the probability value of .014 is below the 0.05 level of significance, the null hypothesis is rejected. The study therefore finds that workflow automation and e-records management significantly affect administrative efficiency in the Nigerian Senate. The implication of this result is that the automation of routine processes and the effective management of electronic records enhance the efficiency of administrative operations. Although the magnitude of the effect is more moderate than that of digital infrastructure, it remains important and meaningful. This suggests that when records are digitized, retrievable, and integrated into workflow processes, the Senate is better positioned to reduce delays, minimize duplication, improve procedural continuity, and strengthen the overall effectiveness of bureaucratic administration.

H03: Staff digital competence has no significant effect on administrative efficiency in the Nigerian Senate.

The result for staff digital competence shows a positive but statistically insignificant effect on administrative efficiency (B = 0.139, Beta = 0.140, t = 1.600, p = .113). Since the probability value of .113 is greater than the 0.05 significance level, the null hypothesis is not rejected. This means that staff digital competence does not have a statistically significant independent effect on administrative efficiency in the Nigerian Senate within the estimated model. Although the coefficient is positive, suggesting that higher digital competence may be associated with better administrative efficiency, the effect is not strong enough to be regarded as statistically significant in this study. This may indicate that staff competence alone is insufficient to drive administrative efficiency unless it is supported by stronger structural and institutional conditions such as robust digital infrastructure and effective workflow systems. In other words, digital skills remain relevant, but their independent contribution appears weaker when compared with the enabling influence of infrastructure and workflow automation.

The hypothesis tests show that digital infrastructure and workflow automation and e-records management significantly improve administrative efficiency in the Nigerian Senate, while staff digital competence does not exert a statistically significant independent effect within the regression model. This suggests that the efficiency gains associated with digital transformation in the Senate are driven more strongly by institutional and system-level digital arrangements than by staff capability alone.

DISCUSSION OF FINDINGS

The first major finding of the study is that digital infrastructure exerts a strong and statistically significant positive effect on administrative efficiency in the Nigerian Senate. This implies that the availability of reliable digital platforms, internet connectivity, hardware, software systems, and related technological facilities substantially improves internal administrative operations. In practical terms, stronger digital infrastructure supports faster document movement, easier information circulation, and better coordination across units. This finding supports Yang et al. (2024), who found that digital transformation enhances governmental efficiency, and Gong and Yang (2024), who showed that digital government performance depends strongly on infrastructure and related strategic conditions. It is also consistent with Tangi et al. (2021), who emphasized that digital transformation is driven not only by technology itself but also by the administrative conditions that make technology functional in practice. More importantly, this result strongly supports the Socio-Technical Systems Theory adopted for the study. The theory holds that organizational effectiveness depends on the proper alignment of the technical system and the social system. In this case, digital infrastructure represents a major component of the technical system. The result suggests that when the Senate possesses stronger digital facilities, the technical foundation of administration becomes more efficient, thereby improving the performance of the entire institutional system. The finding therefore confirms the theoretical claim that administrative efficiency cannot be achieved where the technical environment is weak or fragmented. The second finding is that workflow automation and e-records management significantly improve administrative efficiency. This suggests that digitising records, formalising automated administrative routines, and improving electronic document handling reduce delays, strengthen procedural continuity, and enhance institutional memory. In a parliamentary setting, where official documents, committee communications, approvals, and archival materials are central to daily operations, this result is

especially important. The finding agrees with Shibambu and Marutha (2022), who showed that digital records management is necessary for modern public administration, and with Malatji and Marutha (2023), who found that records management effectiveness depends on proper institutional implementation. It is also in line with Matlala and Ncube (2025), who concluded that ineffective electronic records management weakens institutional efficiency, and with Modiba (2025), who demonstrated that emerging digital tools can strengthen records management practices in public organizations.

This finding also provides further support for the Socio-Technical Systems Theory. Workflow automation and e-records management represent the point where digital technology is integrated directly into everyday work processes. The theory argues that organizational performance improves when technical tools are embedded in operational routines rather than existing as isolated systems. The implication here is that the Senate's administrative efficiency improves not merely because digital tools are available, but because those tools are incorporated into document processing, record retrieval, approvals, and workflow coordination. This confirms the socio-technical proposition that efficiency emerges when technology is properly fitted into institutional procedures and task structures.

The third finding shows that staff digital competence has a positive but statistically insignificant independent effect on administrative efficiency. Although the descriptive and correlation results indicate that digital competence is associated with better administrative efficiency, its effect weakens once digital infrastructure and workflow automation are introduced together in the regression model. This suggests that staff competence alone may not be sufficient to improve efficiency where strong systems and automated processes are not already in place. The finding partially supports Ahn and Chen (2022), who stressed the importance of training and familiarity for public-sector digital adoption, and David et al. (2024), who showed that digital competencies improve adaptability to change. However, the present result indicates that in the Nigerian Senate, competence may operate more effectively as a supporting condition than as a stand-alone determinant. This explanation is further reinforced by van Roekel et al. (2025), who argued that digital transformation in public organizations depends on strategic and operational leadership processes that connect employees, systems, and outputs.

From the standpoint of Socio-Technical Systems Theory, this finding is especially revealing. The theory does not assume that the social system alone can produce efficiency without adequate technical support. Staff digital competence belongs mainly to the social system, since it relates to human capability, knowledge, and adaptation. The insignificance of its independent effect suggests that the social system cannot generate strong efficiency gains in isolation from the technical system. In other words, even when Senate staff possess digital knowledge, their competence may not translate into administrative efficiency unless it is supported by functional infrastructure and embedded automated processes. This finding therefore aligns closely with the theory's central argument that efficiency results from the joint optimization of people and technology, not from either element acting alone.

The findings show that the digital transformation of the Nigerian Senate is most effective when it is grounded in robust infrastructure and automated administrative systems, with staff competence serving as an enabling but not independently sufficient condition. This overall pattern strongly validates the Socio-Technical Systems Theory, which views organizational efficiency as the product of interaction between the technical system and the social system. The results indicate that the Senate's

administrative efficiency depends less on symbolic digitalization and more on the practical integration of infrastructure, workflow systems, records automation, and human capability. The relatively modest mean scores further suggest that the Senate remains in a transitional stage of digital maturity: digital transformation is already improving administrative efficiency, but the full gains will only be realized when technical systems and human competencies are more fully aligned.

CONCLUSION AND RECOMMENDATIONS

This study examined the effect of digital transformation on administrative efficiency in the Nigerian Senate with specific emphasis on digital infrastructure, workflow automation and e-records management, and staff digital competence. The findings show that digital transformation significantly influences administrative efficiency in the Senate, but the strength of that influence differs across its dimensions. Digital infrastructure emerged as the strongest predictor of administrative efficiency, workflow automation and e-records management also had a significant positive effect, while staff digital competence showed a positive but statistically insignificant independent effect. The study therefore concludes that administrative efficiency in the Nigerian Senate is shaped more directly by the availability of functional digital systems and the automation of core administrative processes than by staff competence alone. The broader conclusion is that digital transformation in the Senate has begun to yield measurable administrative benefits, but those benefits remain incomplete because the institution is still at a relatively modest level of digital maturity.

Based on the findings of the study, the following recommendations were made:

i. The Nigerian Senate should prioritise sustained investment in digital infrastructure, including reliable connectivity, integrated digital platforms, and up-to-date hardware, since digital infrastructure recorded the strongest effect on administrative efficiency.
ii. The Senate should deepen workflow automation and electronic records management across departments and committee processes in order to reduce delays, improve document traceability, and strengthen coordination in administrative operations.
iii. Staff training programmes should be made more task-specific and system-oriented so that digital competence is directly linked to the actual platforms, records systems, and workflow applications used in the Senate.

Suggestions for Further Studies

Future studies should examine digital transformation and administrative efficiency across both chambers of the National Assembly in order to compare the Senate and the House of Representatives.

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